IN THE CLAIMS

Claim 1 (Currently Amended): A sulfonamide compound of the formula (I):

$$R^1\text{-}SO_2NHCO\text{-}A\text{-}X\text{-}R^2 \qquad (I)$$

wherein

R^1 is an optionally substituted alkyl, an optionally substituted alkenyl, an optionally substituted alkynyl, an optionally substituted cyclo(lower)alkyl, an optionally substituted aryl or an optionally substituted heterocyclic group;

A is an optionally substituted heteropolycyclic group containing as a heteroatom(s) only oxygen;

X is an alkylene, an oxa, an oxa(lower)alkylene, a lower alkylene-oxa, a carbonyl, a lower alkenylene, an optionally substituted imino, an optionally N-substituted imino(lower)-alkylene, an optionally N-substituted lower alkyleneimino, a thioxa(lower)alkylene or a lower alkylenethioxa; and

R^2 is an optionally substituted aryl, an optionally substituted heterocyclic group or a biphenylyl; or

a salt thereof,

provided that when X is oxamethylene and A is chromanyl, then R^2 is not quinolyl or substituted quinolyl and

provided that when X is oxamethylene, then A is an unsaturated heteropolycyclic group having at least one oxygen atom as a heteroatom, or a saturated heteropolycyclic group having at least 2 oxygen atoms as heteroatoms.

Claim 2 (Currently Amended): The sulfonamide compound of claim 1, wherein,

R^1 is an optionally substituted alkyl, an optionally substituted alkenyl, an optionally substituted alkynyl, an optionally substituted cyclo(lower)alkyl, an optionally substituted aryl or an optionally substituted heterocyclic group, wherein, when these groups are substituted, the substituent is at least one member selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, aryl, heterocycle(lower)alkyl, halogen, amino, substituted amino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carboxy, protected carboxy, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkoxy substituted by substituted amino, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycleoxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group;

A is a heteropolycyclic group having at least one oxygen as a hetero atom substituted by at least one member selected from the group consisting of alkyl, oxo, thioxo, halogen, lower alkoxy, lower alkylthio, cyclo(lower)alkyl, optionally substituted amino, aryl, heterocyclic group(s), lower alkylsulfonyl and lower alkylsulfinyl; and

R^2 is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, wherein, when these groups are substituted, the substituent is at least one member selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, aryl, heterocycle(lower)alkyl, halogen, amino, substituted amino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carboxy, protected

carboxy, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkoxy substituted by substituted amino, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycleoxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group.

Claim 3 (Currently Amended): The sulfonamide compound of claim 2, wherein,

R^1 is an optionally substituted alkyl, an optionally substituted alkenyl, an optionally substituted alkynyl, an optionally substituted cyclo(lower)alkyl, an optionally substituted phenyl or an optionally substituted heterocyclic group, wherein, when these groups are substituted, the substituent is at least one member selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, heterocycle lower)alkyl, halogen, amino, lower alkanoylamino, mono(lower)alkylamino, di(lower)alkylamino, N-(lower)alkyl-N-acylamino, lower alkylsulfonylamino, aryl(lower)alkylamino, N-heterocycle-N-(lower)alkylamino, arylsulfonylamino, arylcarbonylamino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carboxy, protected carboxy, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkanoylamino(lower)alkoxy, mono(lower)alkylamino(lower)alkoxy, di(lower)alkylamino(lower)alkoxy, N-(lower)alkyl-N-acylamino(lower)alkoxy, lower

alkylsulfonylamino(lower)alkoxy, aryl(lower)alkylamino(lower)alkoxy, N-heterocycle-N-(lower)alkylamino(lower)alkoxy, arylsulfonylamino(lower)alkoxy, arylcarbonylamino(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycle-oxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group; and

A is a ~~a~~ saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 to 3 oxygen atom(s),~~,~~

wherein said heterobicyclic group is optionally substituted by at least one member selected from the group consisting of alkyl, oxo, thioxo, halogen, lower alkoxy, lower alkylthio, cyclo(lower)alkyl, amino, lower alkanoylamino, mono(lower)alkylamino, di(lower)alkylamino, N-(lower)alkyl-N-acylamino, lower alkylsulfonylamino, aryl(lower)alkylamino, N-heterocycle-N-(lower)alkylamino, arylsulfonylamino, arylcarbonylamino, aryl, heterocyclic group, lower alkylsulfonyl and lower alkylsulfinyl,

~~,~~ or a salt thereof.

Claim 4 (Previously Presented): The sulfonamide compound of claim 3,

wherein A is a hetero<u>bi</u>cyclic group selected from the group consisting of benzofuranyl, isobenzofuranyl, chromenyl, chromanyl, isochromanyl, benzoxepinyl, cyclopentapyranyl, and furopyranyl, and said hetero<u>bi</u>cyclic groups are optionally substituted by at least one member selected from the group consisting of lower alkyl and oxo,

or a salt thereof.

Claim 5 (Currently Amended): The sulfonamide compound of claim 4, wherein,

R^1 is an alkyl, an alkenyl, a phenyl(lower)alkenyl, a quinolyl, a phenyl optionally substituted by a substituent selected from the group consisting of nitro, alkyl and alkenyl or a thienyl optionally substituted by halogen;

A is benzofuranyl~~,, said heterocyclic group being~~ which may be optionally substituted by alkyl or oxo;

X is a lower alkylene, an oxa(lower)alkylene or an oxa; and

R^2 is a phenyl optionally substituted by a substituent selected from the group consisting of alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, imidazolyl(lower)alkyl, piperidinyl(lower)alkyl, halogen, amino, lower alkanoylamino, mono(lower)alkylamino, di(lower)alkylamino, N-(lower)alkyl-N-(lower)alkanoylamino, N-(lower)alkyl-N-benzoylamino, lower alkylsulfonylamino, phenyl(lower)alkylamino, phenylsulfonylamino, benzoylamino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carboxy, lower alkoxycarbonyl, cyclo(lower)alkyloxycarbonyl, mono(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, phenyl(lower)alkyl, phenyl(lower)alkenyl, phenyl(lower)alkoxy, (N-pyridyl-N-(lower)alkylamino-)(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, phenoxy(lower)alkyl, lower alkylsulfonyloxy(lower)alkyl, hydroxy(lower)alkyl, di(lower)alkylamino(lower)alkyl, phenyl(lower)alkoxy(lower)alkyl, phenylthio(lower)alkyl, thienyl(lower)alkoxy, pyridyloxy(lower)alkyl, phenyl(lower)alkylthio, phenylureido, lower alkoxy(lower)alkoxy, phenyl(lower)alkynyl, dioxothiazolidylidene(lower)alkyl and thienyl optionally substituted by halogen; naphthyl optionally substituted by halogen; a 4-phenylphenyl substituted by halogen; a thienyl optionally substituted by halogen; a

benzothienyl optionally substituted by halogen; a quinolyl optionally substituted by halogen; or a benzooxolanyl optionally substituted by halogen, or a salt thereof.

Claim 6 (Previously Presented): The sulfonamide compound of claim 5, wherein,

R^1 is an alkyl, an alkenyl, a phenyl(lower)alkenyl, a phenyl optionally substituted by a substituent selected from the group consisting of alkyl and alkenyl or a thienyl optionally substituted by halogen;

A is benzo[b]furanyl which may be optionally substituted by one or two alkyl;

X is an alkylene; and

R^2 is a phenyl optionally substituted by a substituent selected from the group consisting of alkyl, alkenyl, alkynyl, lower alkoxy, phenyl, halogen, di(lower)alkylamino, lower alkylthio, lower alkoxycarbonyl, nitro, halo lower)alkyl, phenyl(lower)alkyl, phenyl(lower)alkenyl, phenyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy, phenoxy(lower)alkyl, phenyl(lower)alkoxy(lower)alkyl, phenyl(lower)alkynyl and thienyl optionally substituted by halogen; a naphthyl optionally substituted by halogen; or a 4-phenylphenyl substituted by halogen, or a salt thereof.

Claim 7 (Currently Amended): The sulfonamide compound of claim 6, wherein,

A is a benzo[b]furanyl~~,~~; and

R^2 is a phenyl substituted by halogen, said phenyl being optionally substituted by a substituent selected from the group consisting of alkyl, alkenyl, alkynyl, lower alkoxy, phenyl, halogen, di(lower)alkylamino, lower alkylthio, lower alkoxycarbonyl, nitro, halo(lower)alkyl, phenyl(lower)alkyl, phenyl(lower)alkenyl, phenyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy, phenoxy(lower)alkyl, phenyl(lower)alkoxy(lower)alkyl,

phenyl(lower)alkyl and thienyl optionally substituted by halogen, or a naphthyl substituted by halogen, or a salt thereof.

Claim 8 (Currently Amended): The sulfonamide compound of claim 1 ~~7~~, wherein A is an optionally substituted heteropolycyclic group having one oxygen as the only heteroatom, or a salt thereof.

Claim 9 (Currently Amended): The sulfonamide compound of claim 1 ~~7~~, wherein A is an optionally substituted heteropolycyclic group having two oxygens as the only heteroatoms, or a salt thereof.

Claim 10 (Currently Amended): The sulfonamide compound of claim 1 ~~7~~, wherein A is an optionally substituted heteropolycyclic group having three oxygens as the only heteroatoms, or a salt thereof.

Claim 11 (Previously Presented): A method for producing a compound of the formula (I)

R^1-SO_2NHCO-A-X-R^2 (I)

wherein R^1 is an optionally substituted alkyl, an optionally substituted alkenyl, an optionally substituted alkynyl, an optionally substituted cyclo(lower)alkyl, an optionally substituted aryl or an optionally substituted heterocyclic group;

A is an optionally substituted heteropolycyclic group having 1-3 oxygen atoms as the only heteroatom(s);

X is an alkylene, an oxa, an oxa(lower)alkylene, a lower alkylene-oxa, a carbonyl, a lower alkenylene, an optionally substituted imino, an optionally N-substituted

imino(lower)alkylene, an N-substituted lower alkyleneimino, a thioxa(lower)alkylene or a lower alkylenethioxa; and

R^2 is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl; provided that when A is 3H-imidazo[4,5-b]pyridyl substituted by lower alkyl, R^2 is an optionally substituted aryl, an optionally substituted heterocyclic group or a biphenylyl substituted by a group other than tetrazolyl, and when A is quinolyl substituted by lower alkyl, R^2 is an optionally substituted aryl, an optionally substituted heterocyclic group, or a biphenylyl substituted by at least one group selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, heterocycle(lower)alkyl other than substituted tetrazolylmethyl, halogen, amino, substituted amino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkoxy substituted by substituted amino, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycle-oxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group, or a salt thereof, comprising the step of (1) reacting a compound of the formula (II):

R^1-SO_2NH_2 (II)

wherein each symbol is as defined above, or a salt thereof, and a compound of the formula (III)

HOOC-A-X-R^2 (III)

wherein each symbol is as defined above, or a reactive derivative thereof at carboxy or a salt thereof, to give a compound of the formula (I)

R^1-SO_2NHCO-A-X-R^2 (I)

wherein each symbol is as defined above, or a salt thereof; or

(2) reducing a compound of the formula (I-1)

R^1-SO_2NHCO-A-X-R^{201} (I-1)

wherein R^{201} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, all of which having at least alkynyl, aryl(lower)alkenyl, terminal nitro or terminal formyl and other symbols are as defined above, or a salt thereof, to give a compound of the formula (I-2)

R^1-SO_2NHCO-A-X-R^{202} (I-2)

wherein R^{202} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, all of which having at least alkyl, aryl(lower)alkyl, terminal amino or hydroxymethyl, and other symbols are as defined above, or a salt thereof; or

(3) oxidizing a compound of the formula (I-3)

R_1-SO_2NHCO-A-X-R^{203} (I-3)

wherein R^{203} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, all of which having at least terminal formyl, and other symbols are as defined above, or a salt thereof, to give a compound of the formula (I-4)R^1-SO_2NHCO-A-X-R^{204} (I-4)

wherein R^{204} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, all of which having at least carboxy, and other symbols are as defined above, or a salt thereof; or

(4) acylating a compound of the formula (I-5)

R^1-SO_2NHCO-A-X-R^{205} (I-5)

wherein R^{205} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, all of which having at least hydroxy(lower)alkyl, and other symbols are as defined above, or a salt thereof, to give a compound of the formula (I-6)

R^1-SO_2NHCO-A-X-R^{206} (I-6)

wherein R^{206} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, all of which having at least acyloxy(lower)alkyl, and other symbols are as defined above, or a salt thereof; or

(5) introducing an aryloxy group into a compound of the formula (I-6)

R^1-SO_2NHCO-A-X-R^{206} (I-6)

wherein each symbol is as defined above, or a salt thereof, to give a compound of the formula (I-7)

R^1-SO_2NHCO-A-X-R^{207}

wherein R^{207} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, all of which having at least aryloxy(lower)alkyl, and other symbols are as defined above, or a salt thereof; or

(6) introducing a carboxy-protecting group into a compound of the formula (I-4)

R^1-SO_2NHCO-A-X-R^{204} (I-4)

wherein each symbol is as defined above, or a reactive derivative thereof, to give a compound of the formula (I-8)

R^1-SO_2NHCO-A-X-R^{208} (I-8)

wherein R^{208} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, all of which having at least protected carboxy, and other symbols are as defined above, or a salt thereof; or

(7) amidating a compound of the formula (I-4)

R^1-SO_2NHCO-A-X-R^{204} (I-4)

wherein each symbol is as defined above, or a reactive derivative thereof, to give a compound of the formula (I-9)

R^1-SO_2NHCO-A-X-R^{209} (I-9)

wherein R^{209} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenylyl, all of which having at least optionally substituted amide, and other symbols are as defined above, or a salt thereof; or

(8) adding a nitrogen-containing heterocyclic group to a compound of the formula (I-10)

R^1-SO_2NH-CO-A-X-R^{210} (I-10)

wherein R^{210} is an optionally substituted aryl having at least a halogen atom, and other symbols are as defined above, or a salt thereof, to give a compound of the formula (I-11)

R^1-SO_2NHCO-A-X-R^{211} (I-11)

wherein R^{211} is an aryl substituted by at least heterocyclic group having nitrogen, and other symbols are as defined above,

or a salt thereof.

Claim 12 (Original): A pharmaceutical composition comprising the sulfonamide compound of claim 1 or a pharmaceutically acceptable salt thereof.

Claim 13 (Previously Presented) A method for treating a disease treatable based on a blood sugar level-depressing activity or a disease treatable based on a cGMP-PDE inhibiting activity, smooth muscle relaxing activity, bronchodilating activity, vasodilating activity, smooth muscle cell suppressing activity or antiallergic activity, comprising:

administering an effective amount of the sulfonamide compound of claim 1 or a pharmaceutically acceptable salt thereof to a subject in need thereof.

Claim 14 (Previously Presented) A method for producing a therapeutic agent comprising:

admixing the sulfonamide compound of claim 1 with a pharmaceutically acceptable excipient or carrier.

Claim 15 (Previously Presented) A method for reducing the level of blood sugar comprising:

administering an effective amount of the sulfonamide compound of claim 1 or a pharmaceutically acceptable salt thereof to a subject in need thereof for a time and under conditions effective to reduce the level of blood sugar.

Claim 16 (Currently Amended) A method for inhibiting cGDP-PDE activity comprising:

administering an effective amount of the sulfonamide compound of claim 1 or a pharmaceutically acceptable salt thereof to a subject in need thereof for a time and under conditions effective to inhibit cGDP-PDE activity.

Claim 17 (Currently Amended) A method for relaxing smooth muscle, inducing bronchodilation, inducing vasodilation, suppressing smooth muscle cell activity or inducing antiallergic activity comprising:

administering an effective amount of the sulfonamide compound of claim 1 or a pharmaceutically acceptable salt thereof to a subject in need thereof for a time and under conditions effective to relax smooth muscle, induce bronchodilation, induce vasodilation, suppress smooth muscle cell activity or induce antiallergic activity.

Claim 18 (Currently Amended) The composition of ~~Claim~~ claim 12 that is in a form suitable for oral, parenteral, external, or local administration.

Claim 19 (Currently Amended) The composition of ~~Claim~~ claim 12 that is in the form of a capsule, tablet, sugar-coated tablet, granule, suppository, liquid, solvate, lotion, suspension, emulsion, ointment, or gel.

Claim 20 (Currently Amended) The composition of ~~Claim~~ claim 12, further comprising an adjuvant auxiliary, auxiliary substance, stabilizer, moistening agent, emulsifier, or buffering agent.--